NASA'S MISSION TO PLANET EARTH

EARTH PROBES

DATA INFORMATION SYSTEM

EOS

EARTH OBSERVING SYSTEM

Data Server Overview
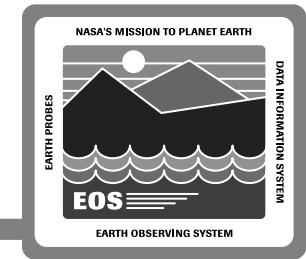
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**ECS Release A SDPS/CSMS Critical Design Review
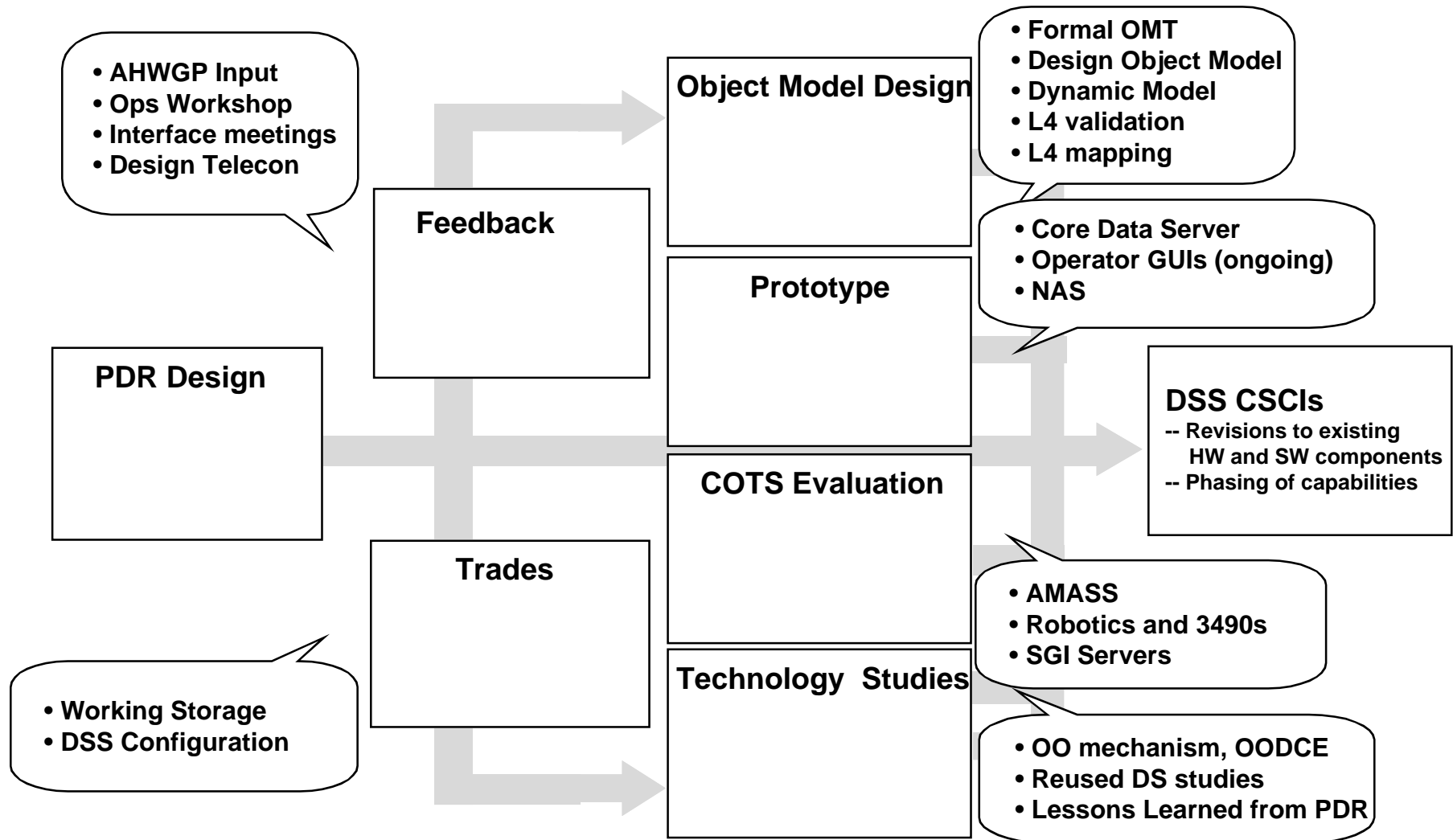16 August 1995**
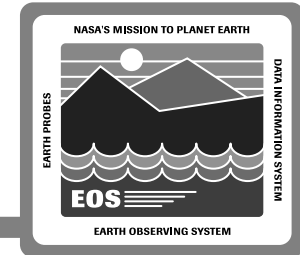
Data Server Subsystem Agenda

- **Progress/Changes Since PDR**
- **Design Drivers and Approaches**
- **Subsystem Architecture**
- **Hardware Analysis and Design Overview**
- **SDSRV CSCI**
- **DDSRV CSCI**
- **STMGT CSCI**
- **DDIST CSCI**

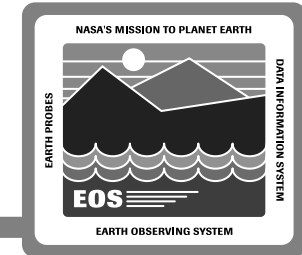# Data Server Subsystem Overview

- **Stores and maintains earth science and related data types**
- **Advertises data types and services it provides against this data**
- **Provides data results via electronic transfer or physical media**
  - **Electronic method offers "push" or "pull" over network**
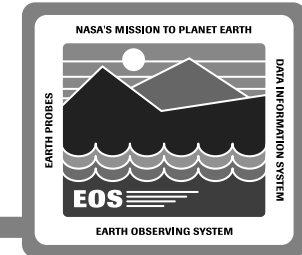 - **Variety of physical media supported**

Data Server Design Approach

PDR Design

Feedback

Trades

- AHWGP Input
- Ops Workshop
- Interface meetings
- Design Telecon

- Working Storage
- DSS Configuration

Object Model Design

Prototype

COTS Evaluation

Technology Studies

- Formal OMT
- Design Object Model
- Dynamic Model
- L4 validation
- L4 mapping

- Core Data Server
- Operator GUIs (ongoing)
- NAS

DSS CSCIs
-- Revisions to existing
    HW and SW components
-- Phasing of capabilities

- AMASS
- Robotics and 3490s
- SGI Servers

- OO mechanism, OODCE
- Reused DS studies
- Lessons Learned from PDR

706-CD-001-001 Day 3

MH1-4

Major Activities Since PDR
System Implementation

	Objective	Related Documents	Results
Network Attached Storage (NAS) Prototype (T-8 Scalability and Maintainability of Archives)	Explore potential application of NFS front ended disk servers within architecture.	**NAS Prototype Report**	Conclusion that small NFS front ended servers are not applicable. Generated test cases and tools for advanced prototype.
Core Data Server (CDS) Prototype (T-4 COTS HSM) (T-5 Cost Effective Storage)	Explore crucial aspects of the server design, including COTS encapsulation.	**CDS Prototype Plan**	Valuable insights and confirmations of design decisions.
Working Storage Study	Evaluate and document staging and internal DSS data flows.	**Working Storage Study**	Coordinated data flows between subsystems. Study to be updated with Release B flows and approaches.
Data Server Subsystem Configuration White Paper	Provide single concise source for sizing and implementation documentation for DSS.	**Data Server Subsystem Configuration WP**	White paper material used in generation of DID 305 volumes.
Hardware Procurements	Provide necessary hardware for CDR prototypes and post CDR development.	**Contract Vehicles**	Target environment available to test system approaches at scale.

Major Activities Since PDR
S/W Implementation

	Objective	Related Documents	Results
Sybase/SQS Release A Approach (T-7 Data Base Management Systems)	Work with vendors to negotiate a cost effective solution to the spatial data base query challenge.	**SQS Functional Specification** **Contract Vehicle**	Cost effective contract/team put in place that will provide for timely Release A solution.
2nd Source DBMS Evaluation	Mitigate risk by providing for cost effective and schedule compatible DBMS fall back option.	**DBMS RFP**	6 vendors are responding to the request. Favorable results look promising.
Document Data Server	Evaluate requirements for Doc Data Server solution.	**Document Data Server Requirements**	Prepared for procurement activities.
AMASS Purchase and Installation	Reduce FSMS risk via experience with scaled product used in architecturally specific manner.	**Contract Vehicle**	Core Data Server Prototype is ongoing. Experiences gained to date show need to work closely with vendor on some possible performance enhancements.

Consistency From PDR

- **General Architecture Consistent**
- **Major Data Flows Unchanged**
- **Design Philosophies Consistent**
  - **Service Based Design (ESDTs)**
  - **Distributed Objects**
  - **Mostly Data Driven**

    (Release B Scheduler Possible for Resources)
  - **COTS Insertion Points Unchanged**
  - **Sizing approaches not significantly different**

Major Changes Since PDR

- **Distributed Objects for Interfaces**
- **OODCE "Factory" Model**
- **COTS Selections Made and Integrated into Design**
- **CSCs Have Been Realigned**
- **STMGT Responsible for Resource Management, DDIST Relieved of this Function**
- **DDSRV Loosely Coupled to SDSRV Design**

CSS Integration

Design Drivers/Approaches

- **Policy Neutral**
  - **Used at different sites in different ways**
  - **Tunable and Reconfigurable**
  - **"We deliver a tuned system and provide tools. The DAACs may use them uniquely."**
- **Support of Heterogeneous Data Types**
  - **Granules may be made up of many "parts"**
  - **"Parts" must be stored, linked, and presented to the requestor as a single granule**
- **Support of Massive I/O and Storage**
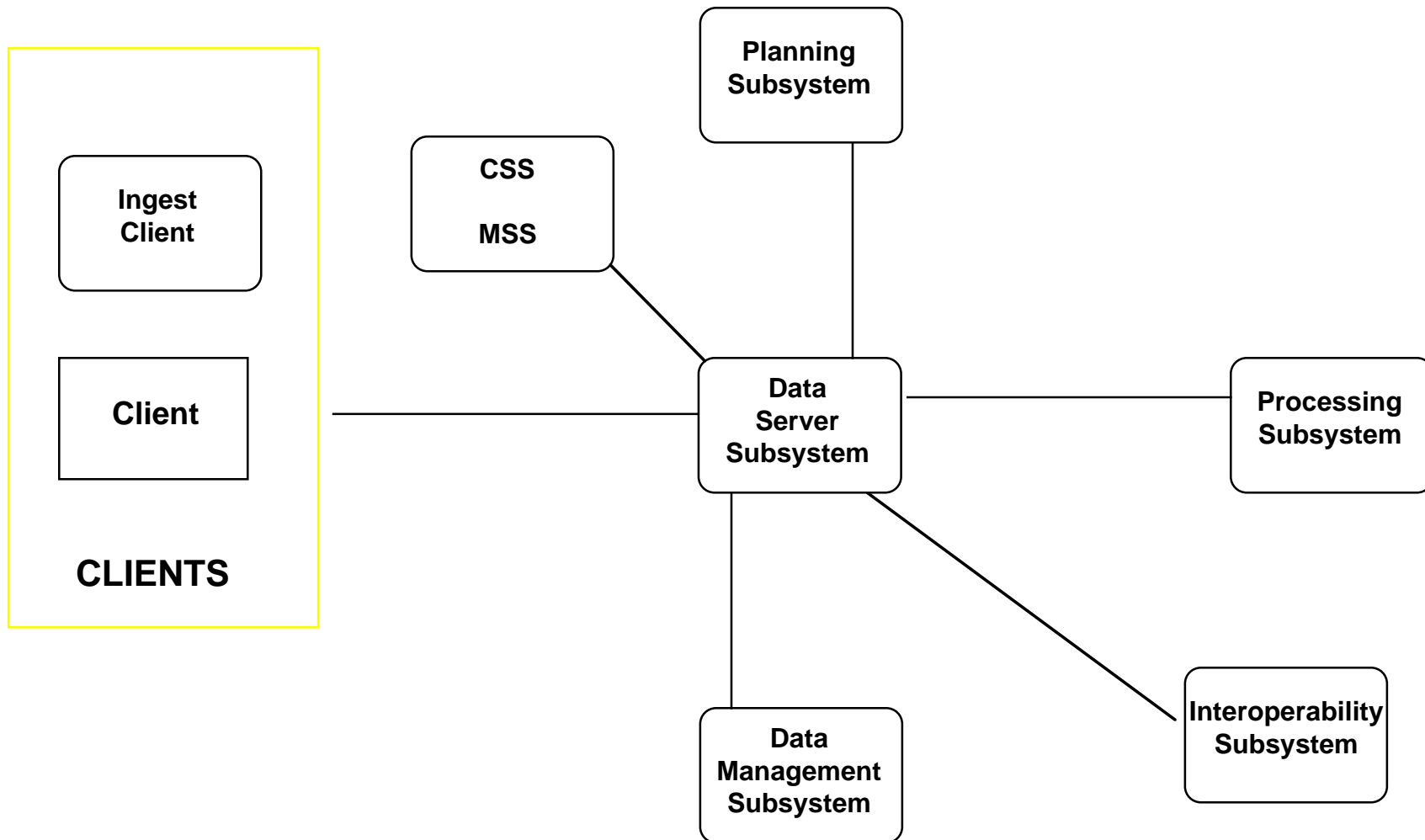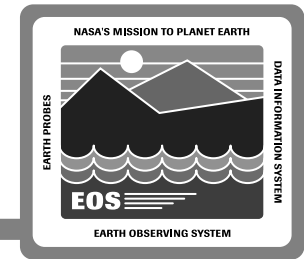
Data Server Subsystem Implementation Concepts

- **System Level Concepts**
  - **Store Data According to Access**
  - **Insert and Acquire Flows Separate**
  - **Architecture of Subsystem Cleaves along API Lines**
- **System Software Concepts**
  - **Consistent Data Access and View**
  - **Storage Methods Hidden/Abstracted From User**
  - **Encapsulation of OTS**
  - **Stateful Connections**
- **Hardware Concepts**
  - **Horizontal Scaling**
  - **Sizing Cognizant of Release B Transition**

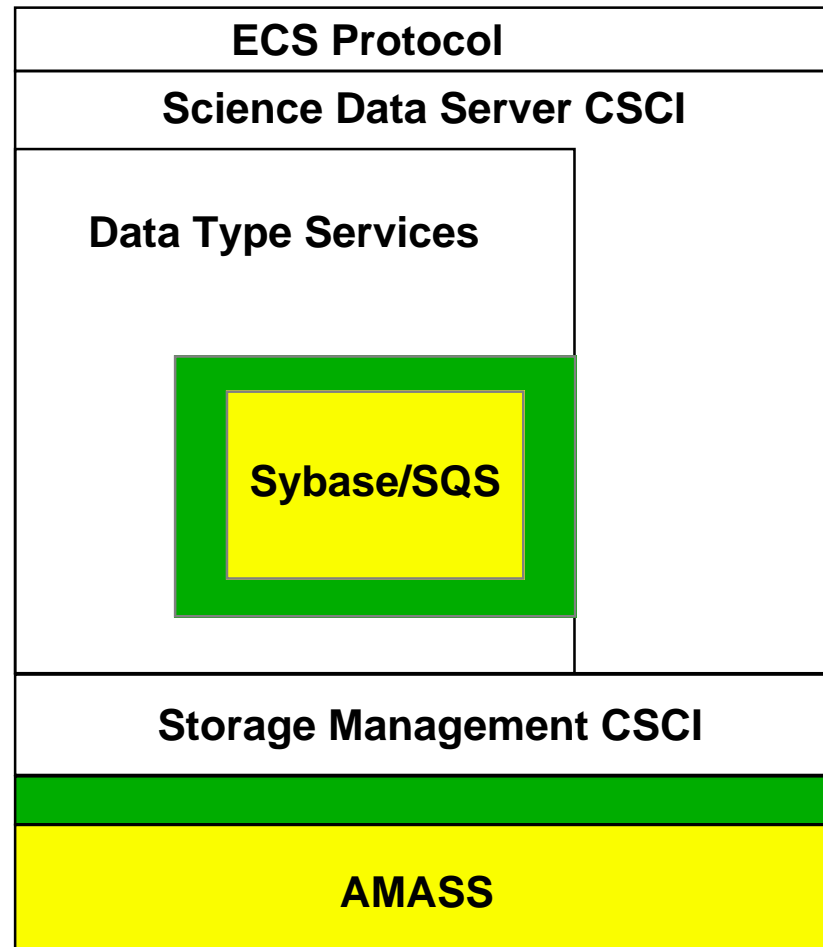# Data Server Subsystem
CDS Prototype Scope

- **PW1 Data Sets**

- **Granule File Inserts**

- **Stateful Connections**

  - **Working Collection**

- **Temporal Search**

- **Electronic Acquires**

  - **Files staged to Pull space**

- **Encapsulation of COTS**

  - **Wrappers defined and implemented**

Data Server Subsystem Context

CLIENTS

- Ingest Client
- Client

CSS / MSS

Planning Subsystem

Data Server Subsystem

Processing Subsystem

Data Management Subsystem

Interoperability Subsystem

COTS Reference Architecture

ECS Protocol
Science Data Server CSCI

Data Type Services

Sybase/SQS

Storage Management CSCI

AMASS

Data Server Subsystem Software Architecture

DATA SERVER SUBSYSTEM

DATA MANAGEMENT SUBSYSTEM

Science Data Server CSCI

DBMS — SQL — SD Server

Storage Management CSCI

FSMS — STMGT Server

File Movement

Distributed Objects Framework

Gateway CSCI

Distributed Objects Framework

CLIENT SUBSYSTEM

HTTP

Document Data Server CSCI

WWW Server — Search Engine

CGI Interface

Data Distribution CSCI

COTS Wrappers

Distributed Objects Framework

PROCESSING SUBSYSTEM

INGEST SUBSYSTEM

PLANNING SUBSYSTEM

Clients

Data Server Subsystem
Primary CSS/MSS Services

- **MSS Logging**

  - User ID, request, request state, data destinations, size of distributions, etc.

- **MSS UserProfile**

- **Life Cycle Services**

  - Startup, shutdown, error coordination

- **Asynchronous Notifications and Callbacks**

- **File Distribution Services (FTP)**

Data Server Subsystem
Common Scenario Review

- **Data Insert Operation**
  - **Data Arrival**
  - **Data Check**
  - **File Storage**
  - **Inventory/Metadata Update**
- **Access and Search**
  - **Access**
  - **Search**
  - **Browse**
- **Data Acquire**
  - **Electronic Acquire**